

**Motorola
SM56 Modem**

Quick Start User's Guide

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1 Overview

This document helps the OEM, system integrator, VAR, and end user with host system selection and proper modem hardware and software installation. It lists qualified host personal computer systems, and explains proper modem use. This document helps you select CPUs, and it explains the tradeoffs associated with different processors. It explains the use of the SM56 Data/Fax/Voice modem with various sound card configurations. It also aids you in troubleshooting and testing the SM56 equipped system.

2 Introduction

Motorola's SM56 Software Modem is a feature-rich modem at an attractive price. It provides high-speed communications between your personal computer and a remote location, such as an Internet Service Provider (ISP), so you can:

- Receive data at up to 56 Kbps in V.90 or K56flex modes

- Get automatic fallback to V.34 (33.6 Kbps) rates in bad line conditions and on non-V.90/K56flex headends
- Use your computer as a **video phone** to place and receive video phone calls (Data/Fax/Voice modem with video equipment)
- Use your computer to conduct hands-off speakerphone **voice calls** (Data/Fax/Voice modem)
- Use your computer as a **telephone answering** machine
- Send and receive faxes on your personal computer at rates up to 14.4 Kbps

Important

The SM56 modem is designed to run on Windows 95, Windows 98, and Windows NT 4.0 (and later). It can also be used by applications that run in an MS-DOS box (under Windows 95/98 only). Windows 95 and Windows 98 use the same SM56 software build. However, Windows NT requires a completely different software build than Windows 95/98. Both builds **are not** supplied on the same distribution media. Please make sure which build you have before attempting to install the modem.

Personal-computer OEMs that incorporate the SM56 can benefit from sizable cost reductions, hardware reduction, and lower power consumption. End users benefit from quick, easy and affordable software upgrades, which help them keep current with the latest communications technology.

Please check with your Motorola Modem supplier for the latest software updates and other product information.

3 Personal Computer Requirements

Motorola performs rigorous, exhaustive testing on its software modems. It developed a list of recommended personal computer features that perform well with the SM56. The information includes qualified CPUs, Level 2 cache requirements, operating systems, RAM requirements, and third-party sound card compatibility. However, in today's dynamic technology markets, it is not possible to test *all* components and combinations on *all* systems.

This section outlines minimum system requirements for SM56 operation. On these systems, CPU loading was found to be acceptable and the modem demonstrated good performance over the entire network model.

Important: SM56 operation is *not limited* to the personal computer systems listed here.

Recommended CPUs

The SM56 modem has been qualified (tested for processor loading and TSB network model coverage) on the following processors:

- Intel Pentium, 150MHz with MMX, 256K Level 2 (L2) cache
- Intel Pentium, 200MHz, 256K L2 cache
- Intel Pentium II
- Intel Pentium Pro
- Intel Celeron (Pentium II, 266MHz, no L2 cache)

The SM56 functions satisfactorily on the following systems. However, it has not been fully qualified (it was not tested for processor loading or TSB performance):

- AMD K6, 233 MHz, 256K L2 cache
- AMD K6-2, 256K L2 cache
- Cyrix 6x86MX, 266MHz, 256K L2 cache

The SM56 does not function on the following CPUs, whose floating-point performance is insufficient:

- Cyrix MediaGX
- Cyrix MediaGXM
- Cyrix 6x86

Level 2 Cache Benefits

Level 2 (L2) cache is an instruction memory (SRAM) bank that resides outside the CPU core. It holds many instructions close to the CPU, to reduce the need for the processor to use slow access cycles fetching instructions from main memory (DRAM). Eliminating most CPU accesses to main memory considerably improves overall system performance.

The SM56 Software Modem works best when a minimum of 256K L2 Cache is installed on the computer system motherboard to minimize processor loading. Intel's Celeron (266MHz PII) systems do not have L2 cache. Although the SM56 operates on those systems, host processor loading increases in the absence of L2 cache.

Compatible Operating Systems

The SM56 modem is compatible with the following operating systems:

- Windows 95 (OEM Service Release 2.0 or later)
- Windows 98
- Windows NT 4.0 (and later)
- DOS Box under Windows 95/98

Important

The SM56 modem is designed to run on Windows 95, Windows 98, and Windows NT 4.0 (and later). It can also be used by applications that run in an MS-DOS box (under Windows 95/98 only). Windows 95 and Windows 98 use the same SM56 software build. However, Windows NT requires a completely different software build than Windows 95/98. Both builds **are not** supplied on the same distribution media. Please make sure which build you have before attempting to install the modem.

System RAM Requirements

The SM56 Software Modem operates on systems that have the minimum RAM required by the installed operating system. As with L2 cache, the more main memory, the better. The recommended RAM is twice the required minimum. This reduces slow hard-disk swapping and

improves overall system performance... especially when executing numerous concurrent processes. The minimum RAM requirements are:

Windows 95/98	16 MB
Windows NT	32 MB

4 Preparing the Computer for SM56 Installation

Preparing the Computer for SM56 Installation on Windows 95/98

To ensure problem-free installation of the SM56 modem, ensure that an IRQ is available, as follows.

1. In Win95/98, open the Control Panel.
2. Double click the **System** icon.
3. Select the **Device Manager** tab.
4. Highlight the **Computer** icon.
5. Select the **Properties** radio button.
6. Ensure that the **Interrupt Request** (IRQ) radio button is selected.

This displays the IRQ lines that are in use on the computer. Available lines are *not* shown in the list. To install the SM56 ISA modem hardware, interrupt line 3, 4, 5, 6, 7, or 9 must be available. The PCI SM56 software modem can use an IRQ in the range 3 through 15.

If there is no IRQ line available for the SM56 disable one of the COM ports in the BIOS.

Note: DOS applications are supported only in a Windows 95/98 DOS box. If you are using a DOS box application, the modem requires two IRQs. Refer to the Troubleshooting section in this document, or to the on-line *User's Guide* for more information on DOS application support. You can access the *User's Guide* through the modem Control Panel.

To ensure that COM Port 2, 3, or 4 is available, you can use the following steps:

1. Open the Control Panel.
2. Double click the **System** icon.
3. Choose the **Device Manager** tab.
4. Highlight the **Ports (COM and LPT)** branch.
5. Expand the branch to see which ports are installed on the computer.

To install the SM56 modem so that it is accessible through older application software and DOS programs, COM port 2, 3, or 4 should be available. If none of these ports are available, you must disable one of the COM ports in the BIOS.

Preparing the Computer for SM56 Installation on Windows NT

Windows NT 4.0 is not a Plug and Play operating system. You can add **ISA Plug and Play** support to Windows NT as follows.

1. Insert the Windows NT 4.0 installation CD-ROM.
2. Using Explorer, point to the *drvlib\pnpisa\x86* directory.
3. Highlight the Plug and Play information file, **pnpisa.inf**, right-click, and select **Install**.
4. Restart the personal computer when the Install Wizard prompts you to do so. ISA Plug and Play support is installed.

To ensure problem-free modem installation, ensure that there is an IRQ available, as follows.

1. Select **Start-->Programs-->Administrative Tools (Common)-->Windows NT Diagnostics**.
2. Select the **Resources** tab.
3. Select the **IRQ** button.

This displays the IRQ lines that are in use on the computer. Available lines are *not* shown in the list. To install the SM56 ISA modem hardware, interrupt line 3, 4, 5, 6, 7, or 9 must be available. The PCI SM56 software modem can use an IRQ in the range 3 through 15.

If there is no IRQ line available for the SM56 disable one of the COM ports in the BIOS.

5 Understanding Sound Card Compatibility and Installing Modem Hardware

Before discussing line interface card installation, let's review the optional sound card connections for SM56 Data/Fax/Voice modems. Recall that SM56 Data/Fax modem does not support the sound subsystem.

Sound Card Compatibility: Data\Fax\Voice Cards

The SM56 Data\Fax\Voice modem requires a sound card to use its speakerphone and answering machine capabilities. There are two methods of interfacing the modem to a sound card:

- TAPI connector
- On-board microphone and speaker jacks

TAPI Connector

Using the on-board TAPI connector requires a soundcard that also has a TAPI-style connector, which has pins that provide analog microphone output and speaker input connections. Many sound cards have one or more CD or auxiliary connectors, but these do not provide the required microphone output for the SM56 modem. To ensure compatibility, check the sound card specifications; one connector must provide a microphone output as well as a speaker input.

Make or buy a cable that routes SM56 signals to the sound card correctly. Locate the 4-pin header connector on the SM56 card. The SM56 connector pin-outs are as follows.

SM56 Pin	Signal
1	Ground
2	Microphone In
3	Ground
4	Speaker Out

On-Board Microphone and Speaker Jacks

If the soundcard does not provide a TAPI-style connector, you can connect the SM56 modem to the sound card by optional on-board microphone and speaker jacks. Ask your modem maker for a board with this option. The microphone jack allows for the direct connection of a microphone to the SM56 modem card. The sound card also has a microphone input.

- To use speakerphone applications with the modem, connect your microphone **to the microphone input jack on the SM56 modem card**. You can then talk into your microphone and hold a conversation with the remote party.
- To record audio (such as a voice mail greeting) on the personal computer, attach the microphone **to the microphone input jack on the sound card**.

You may be able to create a special cable or use a T-splitter to connect one microphone to the input on the modem *and* the sound board simultaneously.

The speaker output jack on the line interface cards can be used in one of two ways:

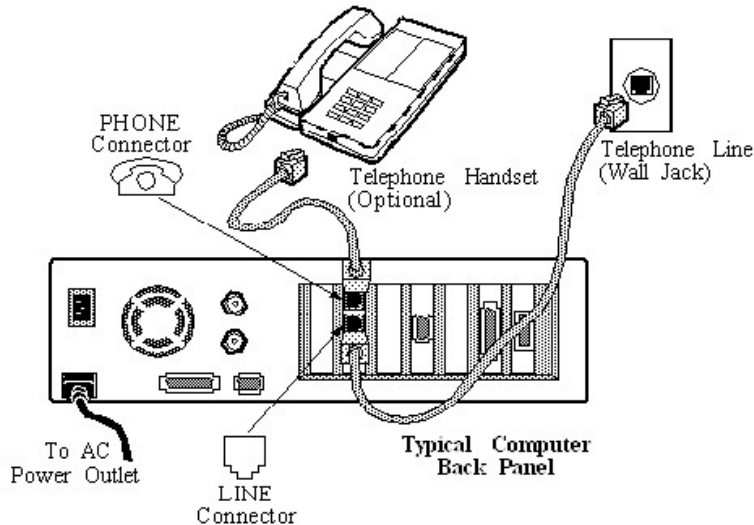
- To directly connect powered speakers to the speaker output jack.
- To connect the SM56 speaker output jack to the sound card line-input jack (this allows the speakers to remain plugged into the sound card).

Hardware Installation: Data/Fax/Voice Cards

Install the modem card as follows.

1. Power down the personal computer.
2. Locate a vacant bus connector (ISA or PCI, depending on your hardware) and insert the modem card.
3. If using the SM56 Data/Fax/Voice Modem, connect the sound subsystem interface cable to the modem card's four-pin connector, and to the sound subsystem interface connector that provides analog microphone and speaker I/O. (Refer to the information above on sound card compatibility.)

4. Connect the modem **Line** input to an analog phone jack using an RJ-11 phone cable. Optionally, connect a telephone handset to the **Phone** input on the line interface card. The external telephone cable connections are as follows.



5. Replace the personal computer cover and power the personal computer on.

6 Installing SM56 Software on Windows 95/98

ISA Slots

The SM56 line interface card for ISA is Plug and Play compatible. The ISA modem requires a block of 16 contiguous I/O addresses, one free interrupt request line (DOS support also requires a second interrupt request line), and a COM port number. The acceptable I/O addresses for the SM56 are 100 to 3FF (hex), starting on zero-byte boundaries. The SM56 for ISA can access interrupt request lines 3, 4, 5, 6, 7 and 9.

PCI Slots

The SM56 for PCI is PCI Plug and Play compliant. It requires one IRQ (IRQ 3, 4,...15) and one memory mapped base address.

Windows 95/98 assigns the modem a COM port number. The SM56 installation software attempts to negotiate a COM port number in the range of 1-4 in order to support older software and DOS games.

Important: The SM56 modem software build numbers for ISA and PCI are different. Ensure that you have the correct version to match your line interface card form factor.

Installing on Windows 95/98

(Note: The Install Wizard may vary slightly with different versions of Windows 95 and Windows 98.)

On starting Windows 95/98 for the first time after installing the SM56 (ISA or PCI) line interface card, the Windows 95/98 Configuration Manager detects the new hardware, assigns resources to it, and then displays a window requesting the modem software drivers. This indicates that the Configuration Manager is looking for the information (INF) file, which contains information about the modem, including device type (Modem), device driver information (the name of the driver that will control the modem) and the AT command/response sets that it supports.

In response to the request window, insert the distribution CD-ROM that contains the SM56 installation software. Select **Driver from Disk Provided by Hardware Manufacturer**. Windows should find the information on the disk and identify the device as the SM56 Modem Line Interface Card. It copies the files from the install disk to the computer.

Note: The SM56 install program may display a message box that reports *Cannot locate file _inst32.ex_* ... If this occurs, browse and re-point the path to the SM56 installation CD ROM again. Then click **OK**.

On boards that have voice capabilities (SM56 Data/Fax/Voice models), another device is found after the modem has been installed. Windows notifies you that it has found a Serial Wave Device for the modem and prompts for a Wave Device driver. Re-point InstallShield to the SM56 distribution disk, and click **OK**.

When these two devices are installed, the SM56 Modem Setup program runs.

SM56 Modem Setup for ISA

The setup program for ISA includes the following.

1. A prompt for the OEM name and phone number. (This information will display in the modem Control Panel.)
2. A prompt for the country of installation. Select a country from the list that appears. Proper modem operation is guaranteed only if you specify the correct country. The SM56 software has been designed for country-specific characteristics for dial tone, ringback tone, busy tone, Caller ID format, and compansion protocol-- μ -Law or A-Law.
3. A prompt for a language. Select a language from the list that appears.
4. For Data/Fax/Voice modems: a prompt for the microphone gain. The gain is applied to the microphone signal that is received at the TAPI connector or the microphone input jack of the SM56 line interface card. The microphone gain amplifier output drives directly into the voice CODEC on the modem board. The total microphone voltage to the CODEC should not exceed its safe operating area (SOA), which is +0.5V to +1.0V (2.5V peak-to-peak maximum). Many sound cards (to which the microphone is normally connected) include their own microphone pre-amplifier stage. To determine this, check your sound board documentation. The total microphone gain is approximately the sum of the sound board microphone gain and the modem supplied gain (selected in this window). The SM56 Install Shield provides the most common microphone gains: -2dB, +2dB, +5.6dB, and +28.4dB. If you are using a microphone connected directly to the microphone input jack of the SM56 line interface card, select a microphone gain of 28.4 dB.

SM56 Modem Setup for PCI

The modem setup program for PCI does not prompt for user input during installation. It defaults to **USA** country code and **Domestic English** as the language for the Help files. If you wish to change either of these settings you may do so via the SM56 PCI Control Panel application (see [Verifying Correct SM56 Installation](#) section) after setup is complete. The SM56 PCI modem is Data/Fax only, so there is no **Microphone Gain** selection.

Determining Microphone Gain Setting

If you connect the modem to the sound card through the internal TAPI connector, use the following procedure to determine the appropriate microphone gain.

1. Determine whether the soundcard has applied any gain to the microphone signal that is presented at its TAPI connector.
2. Use the gain found to determine the gain setting, as follows:

<u>Sound Card gain</u>	<u>Use SM56 gain setting</u>
0 dB - 7 dB	28.4 dB
7 dB - 22 dB	5.4 dB
22 dB - 28 dB	2 dB
28 dB - 40 dB	-2 dB

7 Installing the Modem Software on Windows NT 4.0

Important

The SM56 modem is designed to run on Windows 95, Windows 98, and Windows NT 4.0 (and later). It can also be used by applications that run in an MS-DOS box (under Windows 95/98 only). Windows 95 and Windows 98 use the same SM56 software build. However, Windows NT requires a completely different software build than Windows 95/98. Both builds **are not** supplied on the same distribution media. Please make sure which build you have before attempting to install the modem.

Note: To install the modem on a Windows NT 4.0 platform, you must log into the machine with Administrative privileges.

Installing the SM56 ISA Modem on Windows NT 4.0

When Windows NT boots after first installing the SM56 ISA card, the Windows NT ISA Plug and Play manager detects the new hardware and displays a window requesting information on the new hardware. Insert the disk or CD-ROM with the SM56 Windows NT installation files, and then press **Enter**. Windows NT locates the appropriate installation files on the CD-ROM. Next,

Windows NT either shows a window that lists the resources it will assign to the SM56, or it indicates that you must assign resources manually. Proceed as follows.

If Windows NT assigns SM56 resources:

Note: the Windows NT 4.0 ISA Plug and Play system is not perfect. Sometimes it attempts to assign resources (particularly IRQs) that are in use by other devices. Be aware of this, and ensure that the resources that Windows is trying to assign are indeed free. For example, if you have LPT1 installed on your computer, do not allow Windows NT to assign IRQ 7 to the SM56 modem.

If Windows NT cannot determine SM56 resources:

Windows NT may display a dialog box indicating that it cannot determine SM56 resources. Click on the **Set Configuration Manually** button. Then select the IRQ level so that there are no conflicts listed.

Windows NT prompts you to restart the computer. Select **Yes** to restart. Log on. The SM56 Software Modem Setup program runs automatically. The setup program includes the following:

1. A prompt for the OEM name and phone number. (This information will display in the modem Control Panel.)
2. A prompt for the country of installation. Select a country from the list that displays. (Proper modem operation is guaranteed only if you specify the correct country. The SM56 software has been designed to with country-specific characteristics for dial tone, ringback tone, busy tone, Caller ID format, and compansion protocol-- μ -Law or A-Law.)
3. A prompt for a language. Select a language from the list that appears.
4. For Data/Fax/Voice modems: a prompt for the microphone gain. The gain is applied to the microphone signal that is received at the TAPI connector or the microphone input jack of the SM56 line interface card. The microphone gain amplifier output drives directly into the voice CODEC on the modem board. The total microphone voltage to the CODEC should not exceed its safe operating area (SOA), which is +0.5V to +1.0V (2.5V peak-to-peak maximum). Many sound cards (to which the microphone is normally connected) include their own microphone pre-amplifier stage. To determine this, check your sound board documentation. The total microphone gain is essentially the sum of the sound board microphone gain and the modem supplied gain (selected in this window). The SM56 Install Shield provides the most common microphone gains: -2dB, +2dB, +5.6dB, and +28.4dB.

If you are using a microphone connected directly to the microphone input jack of the SM56 line interface card, select a microphone gain of 28.4 dB.

Determining Microphone Gain Setting

If you connect the modem to the sound card through the internal TAPI connector, use the following procedure to determine the appropriate microphone gain.

1. Determine whether the soundcard has applied any gain to the microphone signal that is presented at its TAPI connector.

2. Use the gain found to determine the gain setting, as follows:

<u>Soundcard gain</u>	<u>Use SM56 gain setting</u>
0 dB - 7 dB	28.4 dB
7 dB - 22 dB	5.4 dB
22 dB - 28 dB	2 dB
28 dB - 40 dB	-2 dB

8 Verifying Correct SM56 Installation

Verify that the SM56 software and hardware installation was completed correctly as follows.

Verifying SM56 Software Installation

1. Verify correct COM port selection.

You can check COM port installation through the **Modems** icon in the Control Panel or through the **SM56** icon in the Control Panel (see below). Normally, the SM56 will install on COM2, COM3, or COM4. Sometimes, however, depending on your computer system setup or Windows setup, the SM56 may install on COM5.

Although the modem functions correctly on COM5, many Internet service provider software applications (such as AOL) do not work if the modem is on a COM port number higher than COM4. If the SM56 installs on COM5, refer to the Troubleshooting section for assistance.

2. Run simple diagnostic from the SM56 Control Panel.

The SM56 software modem provides an informative Control Panel that reports:

- Modem status: in use/not in use; dialing; negotiating a connection; actual connect rate (updated in real time during a connection)
- A button to access the on-line *User's Guide*

The SM56 Control Panel program also provides access to two Windows components:

- COM port and IRQ information
- A diagnostic utility that sends the modem ATI commands and displays the results: software build, modem type (DF or DFV), and more.

The main window of the SM56 Control Panel application looks like this.

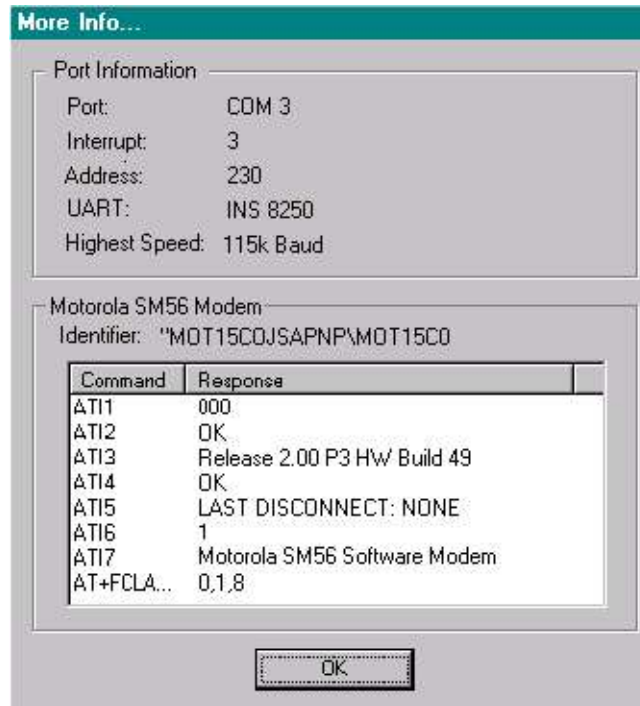


SM56 ISA Control Panel Application



SM56 PCI Control Panel Application

To access the diagnostics option from the Control Panel, click **Properties**; select the **Diagnostics** tab; select the **SM56 Modem** from the list; and then click **More Info**. If the driver is properly installed, a dialog box appears, with responses to the ATi commands as shown in the example below. Refer to the AT Commands section in the on-line *User's Guide* for an explanation of ATi commands.



More Info... Display

Verifying SM56 Hardware Operation

To verify correct SM56 modem card hardware operation (up to the isolation transformer), you can use the following loopback test procedure.

1. **Important:** Remove the telephone line connector from the modem card.
2. Select **Start**.
3. Select **Programs-->Accessories-->HyperTerminal**.
4. Double click the **Hypertrm.exe** icon.
5. Optionally, select a connection name and icon.
6. In the **Connect Using** window, select **Motorola SM56** modem.
7. Enter a number in the **Phone Number** box.
8. Select **Dial**.

9. Select **Cancel**.

10. Enter **AT** <cr>.

The response **OK** should appear.

11. Enter **ATS46 = 23** <cr>.

12. Enter **AT&T1** <cr> . Wait a few seconds.

13. Type some letters at the keyboard. If the hardware is functioning correctly, the letters you type appear on the HyperTerminal display.

9 Changing the Operating System

Before you install a new operating system, you may need to obtain new modem software to match the operating system:

- The SM56 Windows 95 software modem operates under Windows 98. Therefore, a Windows 95 system can be upgraded to Windows 98 without a modem software change.
- The SM56 Windows 95 software modem *does not* operate under Windows NT. The SM56 Windows NT software is very different from the software for Windows 95 or Windows 98. If upgrading from Windows 95/98 to Windows NT, ensure that you have the SM56 modem software for Windows NT, and install it *after* the operating system is completely installed.

Windows 98 Upgrade Error Message

If the SM56 modem is installed on a Windows 95 PC, and then the system is upgraded to Windows 98, the following error message appears when Windows 98 starts:

Duplicated device: vcd

To remove the error, edit the SYSTEM.INI file and locate the line that reads:

Device = *vcd

Delete this line. Save the modified SYSTEM.INI file and restart Windows 98. You will no longer get the error message.

Important: Recall that the SM56 modem software drivers for ISA and PCI modems are *different*. Ensure that you have the version that matches your modem card.

10 Using the SM56 Software Modem

Using the SM56 Modem With 32-Bit Windows 95/98/NT Applications

Because 32-bit Windows 95/98 and Windows NT applications use TAPI for communicating with modems, using the SM56 is as easy as selecting the SM56 modem by name from the list of available modems.

Using the SM56 Modem With 16-Bit Windows 95/98/NT Applications

Because 16-bit applications cannot use the TAPI interface, there is a bit more setup needed.

1. Select **Motorola SM56** modem from the list of supported modems (if the SM56 modem is not shown, select **Hayes Compatible modem**).
2. Configure the application's COM port selection. Use the COM port assigned to the SM56 modem.
3. If the application requires it, enter specific AT commands for the SM56 modem. (For a full list of AT commands, refer to the SM56 on-line *User's Guide*). Some typical AT commands are listed below.

Using the SM56 Modem with DOS-Based Applications and Games

The SM56 modem can be used in DOS *only* through a Windows 95/98 DOS box.

DOS support is achieved through a virtualization of the standard I/O and IRQ assigned to a COM port. This means that the SM56 driver captures and redirects all I/O on the standard I/O address for the COM port to which it assigned. In simpler terms, you tell the application the COM port of the SM56, and then use all the standard I/O and IRQ settings. Standard I/O addresses and IRQs for COM Ports 1-4 are as follows:

COM Port	IO Address	IRQ
1	3F8	4
2	2F8	3
3	3E8	4
4	2E8	3

To determine the SM56 COM port number, open the SM56 Control Panel and select the **Diagnostics** tab. The COM port number to which the SM56 modem is assigned is listed here. Configure your application to use this COM port. For example, if the SM56 modem has been assigned COM 3, configure your application to communicate through COM 3.

Enter the AT commands for the SM56 modem as required by the application. Some typical AT commands are as follows.

AT Commands Commonly Needed by Applications

Applications generally prompt for the following commands.

Initialization*	AT&F
Hangup	ATH0

Dialing string ATDT

Answer string ATA

*Some games require that the modem refrain from performing error correction and data compression. In these cases, use the initialization string **AT&F\N0**.

For a full list of AT commands, refer to the on-line *User's Guide*.

11 Un-installing and Upgrading the SM56 Modem

SM56 Un-Install Procedure

1. Open the Control Panel.
2. Select **Add\Remove Programs**.
3. In the dialog box, select **Motorola SM56 modem**.
4. Select **Add/Remove**.
5. When asked if you want to continue, select **Yes**.
6. Shut down the computer.
7. Remove the SM56 hardware from the computer. (**Note:** If you do not remove the SM56 line interface card, the SM56 will be automatically re-installed when Windows 95/98 restarts.)

The SM56 modem software remains on the PC hard disk for later installs without needing a complete software install again. Simply install the modem card back in the PC and the software will automatically self-install.

SM56 Software Upgrade Procedure

Upgrade the SM56 modem to a newer version as follows.

1. Obtain the latest software version.
2. Run the **setup.exe** program and follow the Upgrade Wizard prompts. The upgrade utility retains a backup of your previous modem version in a folder called **Program Files\Motbak95**.

Recovering From an Unsuccessful Upgrade

If, after an SM56 upgrade, you have problems with the new driver, you can restore your previous SM56 software installation as follows. Perform *all* of the following steps.

1. Open the Control Panel. Select **Add/Remove** programs.

2. If **SM56 Modem** is in the list of installed programs, click on **SM56 Modem**, then Click **Add/Remove** to run the un-install program.

3. Open the **windows\inf\other** folder. Delete all Motorola INF files that are listed there.

4. Edit the Registry and remove the following key if present:

HKLM-->System-->CurrentControlSet-->Services-->SM34DFV

5. Open the Control Panel and determine if the SM56 Modem Control Panel is there. If so, close the Control Panel; open the **windows\system** folder; and delete the **mca.cpl** file.

6. Open the **windows\system.ini** file. Search for **motvcd.vxd**. If it is present, change it to ***vcd**.

7. Restart the computer.

8. Upon restart, the **New Hardware Found** window appears. Enter or browse to: **Program Files\Motbak95**.

9. Perform the SM56 software installation procedure (refer to Section 6 or 7).

12 Troubleshooting

If there is a problem making or receiving a call or transmitting data, and your communications application does not explain the problem, check the following list of symptoms and tips.

- **The modem installs at COM 5**

Some ISP applications, such as America on-line, do not communicate with a COM port higher than COM4. If the SM56 installs on COM5, force the modem to a lower COM port as follows.

1. Open the Control Panel.

2. Double click the **System** icon.

3. Expand the **Ports (COM & LPT)** branch.

4. Make a note of the COM port numbers listed.

5. Expand the **Modem** branch.

6. Make a note of the COM port numbers that the modems occupy.

7. If COM 1-4 are used, free one COM port in the 2-4 range to correct the problem. (This may require disabling a COM port via the system BIOS, or removing any other installed modem.)

8. Double click the **Add\Remove Programs** icon in the Control Panel and un-install the Motorola SM56 modem.
9. Restart the computer and re-install the SM56 modem.

On Windows 95/98: if this procedure fails to force the COM port number to less than COM 5, you can do so, as follows.

- **Resetting the COM Port With an ISA Modem Card**

1. Edit the Windows Registry key under **HKLM-->Enum-->ISAPNP**.
2. Under here is a subkey corresponding to the Device ID of the modem card. Open this key, and open its subkey (generally, it is called 0xFFFFFFFF). Under it is a Data name key called **PortName**.
3. Change the value of this key to the COM port that you want: COM2, COM3, or COM4.

- **Resetting the COM Port With a PCI Modem Card**

1. Edit the Windows Registry key under **HKLM-->Enum-->PCI**.
2. Under here is a subkey with the SM56 modem Vendor ID and Device ID.
3. Open this key, and open its subkey. Under the subkey is a Data name called **PortName**.
4. Change the value of this key to the COM port that you want: COM2, COM3, or COM4.

Important: Ensure that you assign the modem to a free, available COM port.

- **Windows 95/98 DOS box applications do not work with the modem**

1. Open the Control Panel.
2. Double click the **System** icon.
4. Expand the **Modem** branch.
4. Double click the **Motorola SM56** modem.
5. Select the **Modem** tab. Make a note of the COM port number.
6. Select the **Resources** tab. Make a note of the IRQ number listed.
7. For DOS support to operate correctly, the SM56 modem cannot occupy the standard IRQ for the COM port number. (Refer to the table, *Using the SM56 Modem with DOS-based Applications and Games*).

8. Uncheck the **Use Automatic Resources** check box.

Double click on the **Interrupt Request** label and change the IRQ to a different level that is not in conflict with another device. (If there is no free IRQ: free one, or change other device IRQ levels to free a non-standard IRQ).

- **There is no dial tone**

1. Ensure that the telephone cable is securely connected at both ends.
2. Unplug the telephone line cable from the computer, and connect it directly to a telephone from the wall outlet. Check for a dial tone. If there is none, the problem is in the telephone line or system. Call the service provider.

- **The modem cannot complete a connection to another modem**

1. Ensure that your modem is dialing the correct number. Ensure that you've specified the correct area code, if one is required.
2. Determine whether the remote modem is correctly configured to communicate with yours.

- **The modem does not answer incoming calls**

1. Ensure that the automatic answer parameter is set to one of the enabled options, using the ATSO command (ATS0=1 to answer after one ring, and so on).
2. Ensure that no other devices, such as fax or answering machines, are answering calls before the modem does.

- **The modem disconnects while transmission is in progress**

1. Ensure that the telephone cable is securely connected at both ends.
2. Ensure that call-waiting is disabled. In most areas, the command *70 or #70 disables call-waiting. Check with your telephone company for the correct key sequence. (With call-waiting, the incoming call's click sound may be disrupting your call.)

- **Data is not transmitted or received for unusually long periods of time**

Re-dial the call. (The telephone line connection may be poor.)

- **The computer runs slower than usual**

1. Close any open applications that you are not using.
2. Try adjusting the modem's CPU Usage option from **High** to **Medium**; or **Medium** to **Low**. This is in the SM56 Control Panel application.

- **You cannot enter tone selections successfully when calling tone-driven applications**

When dialing a remote system that requires you to enter selections using the telephone keys, such as a voice-mail depot or bank-account information provider, you can lengthen the duration of the tones your modem sends, so that the remote system can detect them better. To adjust DTMF tone length, use the AT+VTD n command, where n specifies the tone duration.

- **The modem does not respond to AT commands**

1. Ensure that your communications software is configured to use the same COM port as the modem's COM port.
2. Reset modem parameters to default options by entering AT&F; then re-enter custom options.
3. SM56 builds after Build 50 require setting the S46 register to 23 before AT&T1 will perform the Local Analog Loop(LAL) back hardware test.

- **The modem responds to commands, but they do not appear on the screen**

Ensure that the Echo option is enabled by entering ATE1.

- **You've installed a new peripheral device; now the modem does not work**

1. In the Windows desktop tray, select **Start**. The start menu appears.
2. Select **Help**. The **Windows Help Topics** window appears.
3. Select the **Contents** tab.
4. Select **If You Have a Hardware Conflict**.
5. A series of troubleshooting actions appears. Follow the appropriate sequence.

- **You hear feedback (noise) from the sound system (Data/Fax/Voice modem only)**

1. Position the speakers at least three feet (1 M) away from the microphone.
2. Ensure that the speakers are facing away from the microphone.
3. Turn down the speaker volume.
4. Speak into the microphone at a distance of at least 12 inches (30 cm) from your mouth. Minimize background noise.
5. If there is still feedback, turn off the microphone boost, under the volume control panel.

- **The modem connects; then meaningless characters appear**

1. Open the **Control Panel**. Double click the **Modem** icon.
2. Select the **Motorola SM56** modem
3. Click on **Properties**.
4. Select **Connection**.
5. Click on **Advanced**.
6. Check the **Use Error Control-Required to Connect** box.

- **The modem cannot connect; the Error Control option is selected**

The modem may be connecting at a rate higher than appropriate for the line conditions.

1. Use the AT%B command to limit the SM56 maximum connection rate. (For a list of AT commands, refer to the on-line *User's Guide*.)
2. Lower the rate, using AT commands, until the problem is corrected. You can add AT commands to do this; refer to the next section .

How to Add AT Commands

1. Open the Control Panel.
2. Double-click the **Modem** icon.
3. Select the **Motorola SM56** modem.

4. Click on **Properties**.
5. Select **Connection**.
6. Click on **Advanced**.
7. In the **Extra Settings** box, add commands as needed.

13 Reporting Problems and Contacting the Modem Supplier

If you have a problem with the modem, ensure that the problem and its solution are not shown in the Troubleshooting section. If you cannot resolve it through troubleshooting, send the following information in an email to your direct modem supplier, so that they can reproduce and resolve the problem.

Information about your computer:

- Brand and model
- CPU type (Pentium, Pentium II, AMD, etc.) Specify if MMX
- CPU clock rate
- Amount of Level 2 cache memory
- Operating system and version (Windows 95 OSR revision level, Windows 98, Windows NT 4.0, etc.)

Information about your modem:

- SM56 modem card version; modifications to your SM56 modem card
- SM56 version number (find this with the **ATI3** command; or with the **More Info** button in the SM56 Control Panel)

Information about your setup:

- The telephone number you are calling from
- The telephone number you are calling to
- If performing a lab test, a detailed description of the equipment used
- The remote modem information

Information about the problem:

- The actions and steps that you performed
- A description of what you saw; be specific
- A description of what you expected to see

14 Understanding SM56 Windows Logo Certification

After rigorous testing at a Microsoft Windows Hardware Quality Lab (WHQL), the ISA bus-based SM56 software modem met the stringent qualifications to receive the **Designed for Microsoft Windows** logo. The logo is targeted at commercially marketed desktop applications that run on the latest released versions of Windows 95, Windows 98, and Windows NT

Workstation. It is not intended for client/server or Windows NT Server applications. The goals of the logo certification program are to improve Windows hardware and software quality, increase end-user satisfaction, and reduce support costs.

To receive the logo, a product must show proof of compatibility with Windows 95/98 *and* NT. The SM56 Software Modem passed the stringent tests to show that, among other capabilities, it:

- Installs and registers itself properly with the operating system
- Is reliably functional and stable
- Removes itself (minus its core components) using an automated uninstaller
- Supports Universal Naming Conventions (UNC) and Long File Names (LFN)

The modem also passed a host of other performance and feature-set tests of its data, fax, and voice modes.

What does the logo mean for the SM56? It means that Motorola and its OEMs, system integrators, and VARs can now use the Windows logo on their products and packaging, and on advertising, collateral, and marketing materials. This signals end users that the SM56 software modem is tested and fully functional on Windows 95/98 and Windows NT 4.0; that it is designed to provide optimum usability and compatibility; and that it takes advantage of the latest technologies provided by these operating systems. It makes users feel more comfortable about purchasing the product, and it assures them of more complete satisfaction while using it.

The Windows logo also means that the SM56 software modem is included on Microsoft's Windows Hardware Compatibility List (HCL) under "Logo," reinforcing to customers and end-users alike that it meets Microsoft's strict requirements and operates properly with Windows operating systems.

In summary, Windows Logo certification increases recognition and adoption of SM56 Software Modem technology worldwide. It demonstrates Motorola's long-term commitment to providing high performance, quality products.

15 An Overview of the V.90 Standard Protocol

In February 1998, the International Telecommunications Union (ITU) formulated the V.90 industry-standard protocol for 56K modems. Before the adoption of the V.90 standard, 56K modems complied with one of two pre-standard implementations: K56flex or X2 technology. Unfortunately for ISPs and end-users, these technologies were not compatible. ISPs had to worry about which standard to employ. End users had to be sure to purchase modems compatible with their ISP's equipment.

Upgrading Motorola's SM56 K56flex modems to V.90 is a software-only upgrade. There is no change to the line interface hardware. This makes it easy for pre-V.90 users to upgrade their system to V.90 compliance.

Note: sometimes V.90 is referred to as V.PCM. PCM is an acronym for Pulse Code Modulation. With V.90, high-speed downstream (from Internet to personal computer) data transmission is accomplished using PCM techniques. Before the ITU formulated its standard V.90 protocol, the industry typically referred to it as V.PCM. This name is fading from use.

V.90 technology allows users to connect to the Internet at rates up to twice as fast as those of V.34 (33.6Kbps) modems. The maximum receive (downstream) rate is 56Kbps, while the return path (upstream) connects at V.34 rates up to 33.6 Kbps. This is perfect for Internet connections, where most data is transferred downstream.

The SM56 begins connections by attempting a V.90 connection to the headend. If the headend is not V.90, the SM56 automatically switches to K56flex mode. If K56flex mode fails (when, for example, the headend uses X2 technology, or there is a noisy phone line condition), the SM56 drops to V.34 rates. This auto-mode switching mechanism ensures maximum compatibility with all remote headends.

On the Web you can visit **www.v90.com** for a wealth of information on V.90 technology, including:

- A list of ISPs that support V.90
- The latest news on V.90
- White papers on the V.90 standard
- Technology descriptions
- Frequently asked questions (FAQs)

Appendix A: SM56 Specifications

- Full Windows 95/98 compatibility; received Microsoft Designed for Windows Logo
- Compatibility with Windows 95/98 communication applications
- Compatibility with communications applications that run in an MS-DOS® box
- An installation engine with country selection. (Selecting the correct country during installation is important, since this selects between A-Law and μ -Law compansion)
- Plug and Play operation
- Support for various data modulation modes:
 - V.90 connection rates if the headend is a true V.90 location. V.90 downstream rates to 56Kbps. Upstream rates to 33.6Kbps (V.34).
 - Fallback to K56flex® mode if the headend is K56flex, not V.90. K56flex® downstream rates to 56Kbps. Upstream rates to 33.6Kbps(V.34).
 - Connection at V.34 rates (33.6 Kbps) if the headend is not V.90 *or* K56flex®.
 - V.32bis, V.32, V.22bis, V.23, V.22/B212, V.21, Bell 103.
- Error correction - V.42, LAPM, MNP2-4
- Data compression - V.42bis, MNP5
- Fax modes supported - V.17, V.27ter, V.29
- Full voice support on Data/Fax/Voice modems
- Full-duplex speaker phone with acoustic and line echo cancellation (Data/Fax/Voice modems only)
- Answering machine capability with PCM and IMA ADPCM audio formats
- Caller ID (USA and Canada)
- Distinctive Ring (USA and Canada)
- Control Panel that provides general modem information and diagnostics
- Full pulse and tone dialing and call progress monitoring

- Adaptive rate re-negotiation (up and down) during a connection to compensate for line dynamics
- Auto dial and answer
- On-line user's guide accessible through the Control Panel

Appendix B: Software License Agreement

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